University of California
Lawrence Livermore National Laboratory

Center for Healthcare Technologies

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The Center for Healthcare Technologies coordinates interdisciplinary projects to develop innovative technologies for improved health care

Mission

The Center for Healthcare Technologies promotes and coordinates a spectrum of research projects that are adapting existing Livermore technologies or developing new technologies to improve the quality and reduce the cost of health care. These projects build on Livermore's core capabilities in physics, chemistry, materials, engineering, instrumentation, and computations as well as in bioscience—a breadth and depth unavailable elsewhere.

Scope of the Problem

Affordable, accessible health care has become an issue of national importance. Each year in the U.S., we now spend about 14% of the gross domestic product—a total of $1 trillion, or about $3000 for every man, woman, and child—on health care. The annual bill for health care is expected to grow even larger in the next few years. Some industries, notably electronics and computers, have invested in and exploited technological innovation to reduce costs without decreasing quality or, alternatively, to improve performance without increasing costs. In marked contrast, medical research and development represents only about 3% of national health care spending, and investment in technology development accounts for only a small fraction of that 3%.

High-Tech Health Care

Over the past decade, numerous Livermore projects exploring improved or new health care technologies have evolved from diverse and often independent research efforts, many of them applying or adapting technologies, devices, and processes developed for our national security mission. We are developing better imaging systems, such as digital x-ray mammography systems. We are continually improving instrumentation and information systems. We are expanding the capabilities of sensor and detection systems, such as accelerator mass spectrometry. Other efforts at Livermore—usually multidisciplinary and involving external collaborators—are already having an impact on the frontiers of research and in the treatment of such maladies as cancer, heart disease, stroke, diabetes, osteoporosis, and repetitive strain injury as well as in such specialty fields as ophthalmology, dentistry, and prosthesis design and manufacture. The Center for Healthcare Technologies coordinates these projects and serves as a point of contact for potential partners and sponsors.

Benefits to the Nation

The benefits of our Center for Healthcare Technologies are felt at regional and national levels. At the state and local levels, we are collaborating with medical researchers at Kaiser Permanente, Stanford University, UC Davis, UC San Francisco, and many other institutions in the development and demonstration of new health care technologies. At the national level, we are providing better health care tools at lower cost. We recently proposed a national strategy for health care technology programs. We envision a government organization, operating under the

National Institutes of Health (NIH), that pursues the best technical solutions to health care problems by combining the scientific and technical expertise of Livermore and other laboratories with the medical expertise of the NIH. In this way, the health care of millions of people can be improved and the escalation of health care costs can be halted.

Current Projects

- Development of a digital mammography system suitable for clinical use, including improved detection instrumentation and algorithms for computer-aided diagnostics.
- Definition and coordination of potential roles for the DOE laboratories in a nationwide telemedicine system.
- Application of advanced imaging technologies to the diagnosis, assessment, and treatment of osteoporosis.
- Computational modeling studies of the injuries resulting from vehicle crashes.
- Development of microfabricated instruments for polymerase chain reaction amplification of DNA.
- Development of a microthin diffractive lens that can correct several common vision problems; development and demonstration of the technologies for manufacturing the lens.
- Development of a patching technique for repairing damaged blood vessels (e.g., associated with stroke) from inside the vessel.
- Development of intravascular probes and other microinstrumentation for minimally invasive surgery.
- Development of new biocompatible materials for use in prosthetic devices.
- Computational modeling of the neuromuscular function of the human hand.
- Application of various optical systems (e.g., lasers) for surgery, photodynamic therapy, and dentistry.
- Modeling studies and dose deposition calculations for improved radiation therapy.

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